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- II. Extract of a Letter from Professor KREIL of Vienna, to Major-General SABINE, Treas. and V.P.R.S., dated Nov. 26, 1858. Communicated by Professor W. H. MILLER, For. Sec. R.S.

“I am returned after an absence of nearly six months, during which I have been travelling in the Danubian Principalities, in Turkey in Europe, and along the south-west and north coasts of the Black Sea, in order to make magnetic observations, and to determine more accurately the geographical position, as well as the magnetic declination, of many points of the coast.”

- III. “Fossil Mammals of Australia (Part I.). Description of a mutilated skull of a large Marsupial Carnivore (*Thylacoleo Carnifex*, Ow.), from a conglomerate stratum, eighty miles S.W. of Melbourne, Australia.” By Professor R. OWEN, F.R.S., &c. Received September 18, 1858.

In this paper the author gives a description of a fossil skull and certain of the teeth of a quadruped of the size of a lion, in which he points out the characters indicative of its carnivorous habits and of its affinities to the marsupial order.

The large size of the temporal fossæ, meeting to form a low crest on the parietal bone, and bounded behind by a strong occipital crest; together with large carnassial teeth in both upper and lower jaws, evince the carnivorous habits of the extinct species. Its marsupial nature is, in the author's opinion, demonstrated by the following cranial structures:—A large vacuity in the bony palate; a proportionally large lacrymal bone extending upon the face and perforated by the lacrymal canal, anterior and external to the orbit; three external precondyloid foramina; the perforation of the basisphenoid by the entocarotid canal; the great interval between the foramen ovale and foramen rotundum; the separation of the tympanic from the petrous bone; and the development of the ‘*bullæ auditoria*’ in the alisphenoid; the position of the outlet for a vein from the lateral sinus behind and above the root of the zygoma; finally, the low and broad occiput, and the very small relative capacity of the brain-case.

In the marsupial order, the present large extinct Carnivore, for which the author proposes the name of '*Thylacoleo* carnifex*,' is most nearly allied to the *Dasyurus* (*Sarcophilus*) *ursinus*; but is very different in its dentition from that and all existing Carnivora.

The fossils described were discovered by William Adeney, Esq., in a calcareous conglomerate stratum in a bank of a lake situated 80 miles south-west of Melbourne, Australia.

IV. "On the Nature of the Action of Fired Gunpowder." By
LYNALL THOMAS, Esq. Communicated by Dr. GRAY.
Received November 17, 1858.

(Abstract.)

Since the year 1797, when Count Rumford made his experiments for ascertaining the initial force of fired gunpowder, an account of which appears in the Philosophical Transactions of that year, very little light has been thrown on the subject. Count Rumford's experiments, valuable in many respects, afforded indeed nothing conclusive respecting it.

The object of the present paper is to show the unsatisfactory nature of the present theory of the action of gunpowder, and to point out some of the principal errors upon which this theory is based. For this purpose, the results of various experiments made by the author, and which were repeated in the presence of a Select Committee at Woolwich, are described and explained.

These experiments are held by the author not only to afford complete evidence of the unsoundness of the present theory, but as sufficiently conclusive to serve as a basis for the formation of a new set of formulæ, both correct and simple, in place of those at present in use.

The initial action of the fired charge of powder upon the shot,—the first movement of the shot itself in the gun,—and the force exerted upon the gun by different charges of powder,—and, therefore, the actual strength of metal required for the gun,—are circumstances, which, as the author believes, have not only been misunderstood, but for which laws have been assigned directly opposed to the truth.

* From *θύλακος*, a pouch; *λέων*, a lion.